REMARKS

The Final Office Action dated April 22, 2004, has been received and reviewed.

Claims 47, 48, 50-56, 58-68, 75-90, and 110-124 are currently pending and under consideration in the above-referenced application, each standing rejected.

Reconsideration of the above-referenced application is respectfully requested.

Information Disclosure Statements

Please note that Supplemental Information Disclosure Statements were filed in the above-referenced application on March 11, 2004, and February 7, 2003, but that the undersigned attorney has not yet received any indication that the references cited in the Supplemental Information Disclosure Statement of March 11, 2004, or the references listed on page 2 of the Form PTO/SB/08A that accompanied the Supplemental Information Disclosure Statement of February 7, 2003, have been considered.

It is respectfully requested that all of the references cited in the Supplemental Information Disclosure Statements of March 11, 2004, and February 7, 2003, be considered and made of record in the above-referenced application and that initialed copies of the Form PTO/SB/08A that accompanied the Supplemental Information Disclosure Statement of March 11, 2004, and of page 2 of the Form PTO/SB/08A that accompanied the Supplemental Information Disclosure Statement of February 7, 2003, be returned to the undersigned attorney as evidence of such consideration.

For the sake of convenience, a second copy of the Supplemental Information Disclosure Statement of February 7, 2003, and of the Form PTO/SB/08 that accompanied that Supplemental Information Disclosure Statement are enclosed, as is a copy of the USPTO date-stamped postcard evidencing receipt of the same by the Office.

Rejections Under 35 U.S.C. § 102(e)

Claims 64-66, 68, 75, 77-79, and 81-83 stand rejected under 35 U.S.C. § 102(e) for reciting subject matter which is purportedly anticipated by the subject matter described in U.S. Patent 5,969,424 to Matsuki et al. (hereinafter "Matsuki").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The description of Matsuki is directed to semiconductor devices with redistribution layers (RDLs) formed thereon. More specifically, as shown in FIG. 2 of Matsuki, a semiconductor device according to Matsuki includes bond pads 4 on an active surface thereof and a first protective insulation substrate 5, through which the bond pads 4 are exposed, over the active surface. Lead wires 7, which include first, second, and third conductive layers 13, 15, and 16, respectively, contact each bond pad 4 and extend laterally therefrom, over the first protective insulation substrate 5. Col. 7, line 65, to col. 8, line 61; *more specifically,* col. 8, lines 60 and 61. A second protective insulation substrate 8 covers all but a terminal end of each lead wire 7 (col. 8, lines 62-65), which is opposite from the end of the lead wire 7 that contacts the corresponding bond pad 4 (*see* FIG. 2). The terminal end of each lead wire 17 is referred to in Matsuki as a "secondary pad 17." Col. 8, lines 65-67. The exposed, secondary pad 17 portion of each lead wire 7 serves as a redistributed bond pad. *See* FIG. 2.

The redistribution layer of Matsuki, through a solder ball 10 that has been secured to the exposed, secondary pad 17 portion of a lead wire 7 thereof, electrically connects the bond pad 4 of the semiconductor device described therein to a corresponding contact 11 of a carrier 12, as shown in FIG. 2, but does not contact the corresponding contact 11 of the carrier 12. Col. 9, lines 2-18.

Alternatively, as described at col. 9, lines 15 and 16, a bond wire may be secured directly to the secondary pad 17 portion of the lead wire 7, and to thereby establish electrical communication between the lead wire 7 and a corresponding contact 11 of a carrier 12.

Thus, it is apparent that Matsuki lacks any express or inherent description, or any teaching or suggestion, that the multi-layered lead wires 7 described therein may be used in any capacity other than as conductive traces within a redistribution layer of a single semiconductor device.

Independent claim 64 is drawn to a semiconductor device assembly which includes a carrier, at least one semiconductor die adjacent to the carrier, and conductive elements extending between and contacting contacts of the carrier and corresponding bond pads of the at least one semiconductor die. The carrier, in addition to contacts, includes circuitry that is in communication with the contacts. The conductive elements, which extend from contacts to their corresponding bond pads, electrically connect circuitry of the at least one semiconductor die to the circuitry of the carrier. Each conductive element includes a plurality of superimposed, contiguous, mutually adhered layers of conductive material.

While the lead wires 7 of Matsuki contact a bond pad 4 of a semiconductor device, they do *not contact* a contact 11 of the carrier 12. Rather, as col. 9, lines 2-18 of Matsuki quite clearly explains, an intervening solder ball 10 or bond wire (not shown) is required to establish communication between each lead wire 7 and its corresponding contact 11 of a carrier 12. Therefore, Matsuki does not expressly or inherently describe a semiconductor device assembly that includes conductive elements that extend between and *contact* contacts of a carrier and bond pads of a semiconductor die, as required by independent claim 64.

Moreover, Matsuki does not include any express or inherent description that the solder ball 11 or bond wire that has been positioned between the secondary pad 17 portion of each lead wire 7 and its corresponding contact 11 includes a plurality of superimposed, contiguous, mutually adhered layers. Therefore, Matsuki does not anticipate a conductive element that includes a plurality of superimposed, contiguous, mutually adhered layers *and* contacts both bond pad 4 and contact 11.

As Matsuki does not anticipate each and every element of independent claim 64, it is respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 64 is allowable over the subject matter described in Matsuki.

Each of claims 65, 66, and 68 is allowable, among other reasons, for depending from claim 64, which is allowable.

Independent claim 75 recites a semiconductor device assembly. The semiconductor device assembly of independent claim 75 includes first and second semiconductor device components and at least one conductive element. Each of the first and second semiconductor device components includes at least one contact pad. The at least one conductive element contacts both the at least one first contact pad of the first semiconductor device component and the at least one second contact pad of the at least one second semiconductor device component.

Again, Matsuki lacks any express or inherent description that the lead wire 7 thereof contacts both the bond pad 4 of the semiconductor device thereof and the contact 11 of the carrier 12 thereof. Instead, as shown in FIG. 2 and explained at col. 9, lines 2-18 of Matsuki, a solder ball 10 or bond wire (not shown) is positioned between the lead wire 7 and the contact 11 to facilitate electrical communication therebetween.

Because Matsuki does not anticipate each and every element of independent claim 75, it is respectfully submitted that, under 35 U.S.C. § 102(e), independent claim 75 is allowable over Matsuki.

Claims 77-79 and 81-83 are each allowable, among other reasons, for depending either directly or indirectly from claim 75, which is allowable.

Claim 82 is further allowable since Matsuki does not include any express or inherent description that carrier 12 thereof includes a conductive trace that is carried by a support structure thereof and that is in communication with contact 11.

Claim 83, which depends from claim 82, is additionally allowable since Matsuki lacks any express or inherent description that either a support structure or a conductive trace of the carrier 12 thereof includes a plurality of superimposed, contiguous, mutually adhered layers. Rather, the Matsuki merely describes a lead wire 7 that includes multiple layers 13, 15, 16.

For these reasons, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 64-66, 68, 75, 77-79, and 81-83 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 47, 48, 50-56, 58-63, 67, 75, 76, 84, 85, and 110-124 stand rejected under 35 U.S.C. § 103(a).

M.P.E.P. 706.02(j) sets forth the standard for a rejection under 35 U.S.C. § 103(a):

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Matsuki in View of Lee

Claims 47, 48, 50-56, 58-63, 67, 76, and 110-124 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is purportedly unpatentable over that taught in Matsuki, in view of teachings from U.S. Patent 4,954,873 to Lee et al. (hereinafter "Lee").

The teachings of Matsuki have been summarized above.

Lee teaches an anisotropic (*i.e.*, z-axis) elastomeric conductor that is formed by slicing a block that is formed from a plurality of stacked sheets. *See, e.g.*, FIG. 1. The block includes sheets which include parallel electrically conductive fibers that have been interspersed between sheets that are formed from an insulative material. *See, e.g.*, FIGs. 1 and 4; col. 4, line 55, to col. 5, line 34. An elastomer is introduced into the stacked sheets. Col. 5, lines 35-59. Once the elastomer hardens or cures, the block is sliced along planes that are oriented transversely (*e.g.*, perpendicularly) to the planes in which the sheets of the block are located. FIG. 4; col. 5, line 60, to col. 6, line 6. Each anisotropic conductor that has been formed in this manner thus includes conductive elements 14 which extend perpendicular to a plane thereof. FIGs. 4-6; col. 5, line 60, to col. 6, line 2.

Independent claim 47 recites a conductive trace that is at least partially formed on at least one semiconductor device component. The conductive trace of independent claim 47 includes a plurality of superimposed, contiguous, mutually adhered layers, each of which comprises conductive polymer. At least a portion of the conductive trace is configured to extend and conduct electrical signals along a plane which is parallel to a plane in which the at least one semiconductor device component is located.

Independent claim 52 is drawn to a semiconductor device that includes a semiconductor device component and at least one conductive trace carried by the semiconductor device component. The at least one conductive trace of independent claim 52 includes a plurality of superimposed, contiguous, mutually adhered layers. Each of the layers comprises conductive polymer. At least a portion of the at least one conductive trace is configured to extend and conduct electrical signals along a plane which is parallel to a plane in which the at least one semiconductor device component is located.

Independent claim 110 is directed to a conductive trace that is at least partially formed on at least one semiconductor device component and comprises a plurality of superimposed, contiguous, mutually adhered layers. Each of the layers of the conductive trace comprises the same conductive polymer material. At least a portion of the conductive trace is configured to extend and conduct electrical signals along a plane which is parallel to a plane in which the at least one semiconductor device component is located.

Independent claim 114 recites a semiconductor device that includes a semiconductor device component and at least one conductive trace carried by the semiconductor device component. The at least one conductive trace of independent claim 114 includes a plurality of superimposed, contiguous, mutually adhered layers, each of which comprises the same conductive polymer material. At least a portion of the conductive trace is configured to extend and conduct electrical signals along a plane which is parallel to a plane in which the at least one semiconductor device component is located.

It is respectfully submitted that a *prima facie* case of obviousness has not been established against any of independent claims 47, 52, 110, or 114 for at least two reasons.

First, it is respectfully submitted that the anisotropic elastomeric conductors of Lee could not be used to form the lead wires of Matsuki and, thus, that one of ordinary skill in the art would have no reason to expect the asserted combination of teachings from Matsuki and Lee to be successful. In particular, the anisotropic elastomeric conductors of Lee are sheets with conductive elements that extends transversely relative to the planes thereof, not laterally along the planes. If the anisotropic elastomeric conductors of Matsuki were to be used as the lead wires 7 of the assembly taught in Matsuki, the conductive elements would only be able to conduct electricity between the upper and lower surfaces of the lead wires 7, not along the lengths thereof. Thus, electricity could not be communicated from a bond pad 4 at one end of such a lead wire 7 to a secondary pad 17 at the other, terminal end of the lead wire 7. Nonetheless, Matsuki requires that electricity be conducted along the lengths of lead wires 7 to establish communication between bond pads 4 and contacts 11.

For this reason, one of ordinary skill in the art would have had no reason to expect that the asserted combination of teachings from Matsuki and Lee would have been successful.

Second, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine the teachings of Matsuki and Lee in the manner that has been asserted. In particular, the teachings of Matsuki are limited to redistribution layers that include *metal* lead wires 7 that extend and conduct electric signals along planes that are substantially parallel to a plane in which the underlying semiconductor devices are located. Lee, in contrast, teaches anisotropic elastomeric conductors. When an anisotropic elastomeric conductor of Lee is used with a semiconductor device, as shown in FIG. 5 of Lee, the conductive elements thereof are oriented perpendicularly relative to a plane in which the semiconductor device is located. Thus, the conductive elements of the anisotropic elastomeric conductor of Lee conduct electrical signals in a direction which is perpendicular to the plane in which an adjacent semiconductor device is located (*i.e.*, only between the top and bottom surfaces of the planar anisotropic elastomeric conductor). In view of these divergent teachings, it is not understood how, other than on the basis of improper hindsight provided by the description of the above-referenced application, one of ordinary skill in the art would have been motivated to combine the teachings of Matsuki and Lee in such a way as to render obvious the recitation of conductive elements that

comprise conductive polymer and that are at least partially "configured to extend and conduct electrical signals along a plane which is parallel to a plane in which . . . at least one semiconductor device component is located" in independent claims 47, 52, 110, and 114.

Accordingly, it is respectfully submitted that a *prima facie* case of obviousness has not been established against any of independent claims 47, 52, 110, or 114 and, thus, that under 35 U.S.C. § 103(a), each of these claims is allowable over the teachings of Matsuki and Lee.

Claims 48, 50, and 51 are each allowable, among other reasons, for depending from claim 47, which is allowable.

Claims 53-56 and 58-63 are each allowable, among other reasons, for depending either directly or indirectly from claim 52, which is allowable.

Claim 67 is allowable, among other reasons, for depending from claim 64, which is allowable.

Claim 76 is allowable, among other reasons, for depending from claim 75, which is allowable.

Each of claims 111-113 is allowable, among other reasons, for depending from claim 110, which is allowable.

Claims 115-124 are all allowable, among other reasons, for depending either directly or indirectly from claim 114, which is allowable.

Congleton in View of Matsuki

Claims 75, 84, and 85 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is purportedly unpatentable over that taught in U.S. Patent 5,007,576 to Congleton et al. (hereinafter "Congleton"), in view of teachings from Matsuki.

Congleton teaches, among other things, the use of ribbon or wire leads 16 to connect contacts 10a of a semiconductor device 10 to corresponding contacts 12b, 12c, 12d of a circuit board 12.

The teachings of Matsuki are summarized above.

It is respectfully submitted that the teachings of Congleton and Matsuki do not support a *prima facie* case of obviousness against independent claim 75 because one of ordinary skill in the

art would not have been motivated to combine the teachings of these references in the manner that has been asserted. Specifically, Congleton teaches semiconductor device assemblies which include leads positioned between the contacts of a semiconductor die and a carrier. The contacts of both the semiconductor die and the carrier of Congleton are exposed. More specifically, as shown in Fig.1.b. of Congleton, the contacts 10a of a semiconductor device component, referred to as "component 10," are shown as being exposed at the upper surface thereof, while corresponding contacts 12c of a test substrate 12 are exposed laterally beyond the outer periphery of component 10. This configuration permits leads 16 to be secured between corresponding pairs of contacts 10a and 12c. In contrast, Matsuki teaches that the bond pads 4 of the semiconductor die thereof and the contacts 11 of the carrier 12 taught therein are to be sandwiched between the semiconductor die and the carrier, not exposed to the exterior of such an assembly. Thus, it would be difficult, if not impossible, to directly connect leads such as those described in Congleton to both the bond pads 4 and the contacts 11.

Moreover, Congleton does not teach or suggest that these leads may include more than one layer of conductive material. While Matsuki teaches lead wires 7 that include multiple layers 13, 15, 16 of conductive material, the teachings of Matsuki are limited to use of the lead wires 7 in a redistribution layer of a single semiconductor device. The lead wires 7 are, in fact, fabricated as part of the redistribution layer.

For these reasons, it is respectfully submitted that none of Matsuki, Congleton, or the knowledge that was generally available in the art before the filing date of the above-referenced application would have provided one of ordinary skill in the art with the requisite motivation to use multi-layered lead wires 7, such as those taught in Matsuki, in the assembly of Congleton.

Moreover, as the use of photoresists, as employed in the method taught in Matsuki, is typically very expensive, one of ordinary skill in the art would not have been motivated to use the processes that are taught in Matsuki to form an assembly in accordance with the teachings of Congleton.

Due to these differences between Congleton and Matsuki, it is further submitted that any motivation to combine the teachings of Congleton and Matsuki in the manner that has been

asserted could only have been improperly gleaned from the hindsight provided by the disclosure of the above-referenced application.

It is, therefore, respectfully submitted that, under 35 U.S.C. § 103(a), independent claim 75 is allowable over the teachings of Congleton and Matsuki.

Claims 84 and 85 are both allowable, among other reasons, as depending either directly or indirectly from claim 75, which is allowable.

ELECTION OF SPECIES REQUIREMENT

It is respectfully submitted that claim 75 remains generic to both species of invention that have been identified by the Office. Accordingly, consideration and allowance of claims 80 and 86-90 is respectfully requested.

CONCLUSION

It is respectfully submitted that each of claims 47, 48, 50-56, 58-68, 75-79, 81-85, and 110-124 is allowable. An early notice of the allowability of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,

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Date: June 24, 2004

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